



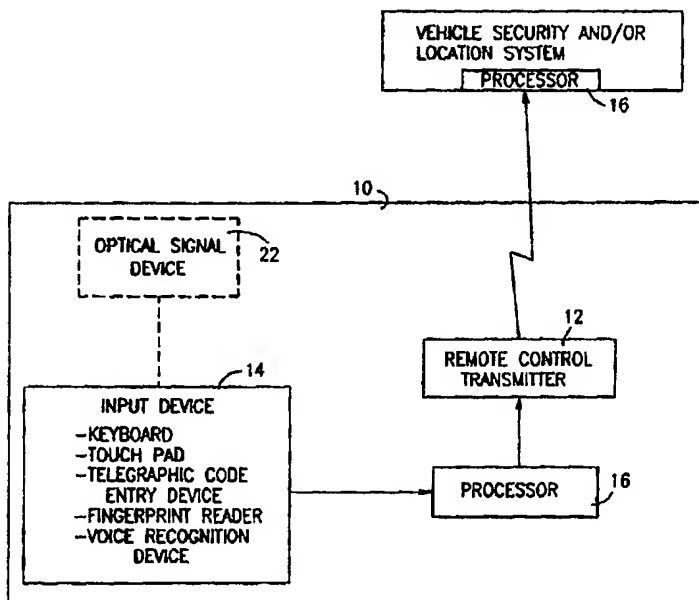
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: PERSONAL ACCESS CODE REMOTE CONTROL

## (57) Abstract

A remote control system (10) including a remote control transmitter (12), an input device (14), and a processor (16) in communication with the transmitter (12) and the input device (14), characterized by the processor (16) being operative to process an access code entered into the input device (14), to compare the entered code with a valid access code and to command the transmitter (12) to transmit a valid operating signal only upon entry of a valid personal access code into the input device (14).



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## PERSONAL ACCESS CODE REMOTE CONTROL

## FIELD OF THE INVENTION

The present invention relates generally to remote control systems, and particularly to a remote control that transmits a valid operating signal only upon prior entry of a valid personal access code, such a remote control being particularly useful in a vehicle security system.

## BACKGROUND OF THE INVENTION

Many kinds of remote controllers are known for operating alarm or security systems of vehicles. A problem is that remote control devices used with vehicles can be pilfered or copied, thereby allowing unscrupulous individuals unauthorized access to the vehicle.

The prior art recognizes the need to personalize remote controllers in order to confound attempts of unauthorized individuals to use the remote controllers.

In US Patent 5,654,688, a controller learns a unique code of a remote transmitter that is capable of causing the operation of various functions associated with vehicle security. The controller performs transmitter verification, i.e., an indication of whether a new uniquely coded remote transmitter has been learned by the controller. The remote transmitter verification is based upon the controller being recently entered into the remote transmitter learning mode. Verification can be incorporated in a remote keyless entry system, remote engine starting system, and door access system. Indication of verification can be provided at or remote from the vehicle and may be either visual or audible. However, in this system, no personal access code is entered into a remote control device.

British Patent GB 2298071 describes a security system wherein a remote control wireless transmitter generates remote control command signals for the system to enter a valet mode. A system controller is responsive to the remote control commands signals to enter a secure valet mode and the system is disabled from tripping and performing the security functions. The valet mode may be entered via wireless remote control signals received from the transmitter. However, this system does not teach or show entering a personal access code into a remote control device.

US Patent 5,467,070 describes a vehicle security system that includes a secure valet/programming switch inside the vehicle. To enter the system valet mode (i.e. switch off the security system), or to select a function via the valet/programming switch, the user must first enter a valid personal access code via the switch. To prevent an intruder from deciphering the personal

code by trying various codes, the system ignores, after a preset number of successive invalid entries, further switch inputs for preset period of time. When attempts to decipher the code are detected, an alarm is tripped, and a siren will sound. To accommodate various drivers of the same vehicle, more than one valid code can be stored in the system. Any of the personal access codes  
5 may be changed any time, but after the user's present code is entered. It should be noted that although the '070 patent uses a personal access code, nevertheless this access code is used only once the user is *inside* the vehicle. The '070 patent does not teach or show entering a personal access code into a remote control device.

Other relevant patent documents include US Patents 5,218,358; 5,278,547;  
10 5,673,017; 5,559,493; 5,585,779; 5,654,688; 5,673,017; and 5,708,308. None of the prior art teaches entering a personal access code into a remote control device in order to allow the remote control device to transmit an operating signal.

#### SUMMARY OF THE INVENTION

The present invention seeks to provide an improved remote control system wherein  
15 a personal access code must be entered into the remote control system in order to allow the remote control system to transmit an operating signal. Such a remote control system is particularly useful for transmitting a valid operating signal to a vehicle security and/or location system. By assigning a personal access code to the remote control system, an unauthorized individual cannot disarm the vehicle security and/or location system by merely stealing the remote control system  
20 because that individual does not know the personal access code.

There is thus provided in accordance with a preferred embodiment of the present invention a remote control system including a remote control transmitter, an input device, and a processor in communication with the transmitter and the input device, the processor being operative to process an access code entered into the input device, to compare the entered code  
25 with a valid access code and to command the transmitter to transmit a valid operating signal only upon entry of a valid personal access code into the input device.

In accordance with a preferred embodiment of the present invention the transmitter and the input device are housed together with the processor. Alternatively, the transmitter and the input device may be housed separately from the processor. Preferably the transmitter controls  
30 operation of at least one of a vehicle security system and a vehicle location system. The processor

may be housed together with at least one of the vehicle security system and the vehicle location system.

The input device may include a keyboard, a touch pad, a telegraphic code entry device, an optical signal device, a fingerprint reader and/or a voice recognition device.

5           There is also provided in accordance with a preferred embodiment of the present invention method for remote control operation, including entering a personal access code into a remote control system, processing the entered access code and comparing the entered code with a valid access code, and transmitting a valid operating signal only upon entry of a valid personal access code.

10           In accordance with a preferred embodiment of the present invention the method also includes transmitting a decoy operating signal upon entry of a non-valid personal access code.

Further in accordance with a preferred embodiment of the present invention the method also includes transmitting a warning signal of an unauthorized access attempt if a number of entries of non-valid personal access codes is greater than a predetermined amount.

15           Still further in accordance with a preferred embodiment of the present invention the method also includes encrypting the transmitted signal.

In accordance with a preferred embodiment of the present invention the valid operating signal is generated as a function of the valid personal access code.

20           Further in accordance with a preferred embodiment of the present invention the valid operating signal includes a randomly generated code.

Still further in accordance with a preferred embodiment of the present invention the step of entering the personal access code includes entering alphanumeric data.

25           Additionally in accordance with a preferred embodiment of the present invention the step of entering the personal access code includes entering data in accordance with a telegraphic code.

In accordance with a preferred embodiment of the present invention the step of entering the personal access code includes a combination of keyed-in signals and optical signals.

Further in accordance with a preferred embodiment of the present invention the step of entering the personal access code includes entering fingerprint identification information.

30           Still further in accordance with a preferred embodiment of the present invention the step of entering the personal access code includes entering voice recognition information.

Additionally in accordance with a preferred embodiment of the present invention the step of transmitting a valid operating signal disarms operation of at least one of a vehicle security system and a vehicle location system.

5 In accordance with a preferred embodiment of the present invention the step of transmitting a valid operating signal initiates operation of at least one of a vehicle security system and a vehicle location system.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood and appreciated more fully from the following detailed description, taken in conjunction with the drawings in which:

10 Fig. 1 is a simplified block diagram illustration of a remote control system constructed and operative in accordance with a preferred embodiment of the present invention; and

Fig. 2 is a simplified flow chart illustration of a method for remote control operation of a system, in accordance with a preferred embodiment of the present invention.

#### 15 DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Reference is now made to Fig. 1 which illustrates in block diagram form a remote control system constructed and operative in accordance with a preferred embodiment of the present invention. A remote control system 10 includes a remote control transmitter 12, such as that used in conventional remote control devices, and an input device 14 for inputting a personal access code, as will be described further in detail hereinbelow. A processor 16, preferably a microprocessor, is in communication with transmitter 12 and input device 14. Processor 16 preferably recognizes different kinds of code, such as, but not limited to, rolling or hopping codes. Processor 16 processes an access code entered into input device 14, compares the entered code with a valid access code and commands transmitter 12 to transmit a valid operating signal only upon entry of a valid personal access code into input device 14.

25 Such a remote control system is particularly useful for transmitting a valid operating signal to a vehicle security and/or location system 20. As discussed above, remote control devices used with vehicles can be pilfered or copied, thereby allowing unscrupulous individuals unauthorized access to the vehicle. By assigning remote control system 10 a personal access code, an unauthorized individual cannot disarm vehicle security and/or location system 20

by merely stealing remote control system 10 because that individual does not know the personal access code.

Processor 16 most preferably is housed in remote control system 10 together with transmitter 12 and input device 14. In such an embodiment, processor 16 may encrypt the signal to be transmitted. For example, compressive, one-way cryptological functions, known as hash functions, may be used to secure the communication between remote control system 10 and vehicle security and/or location system 20. To provide a greater level of trust, mutual zero-knowledge interaction authentication sessions between remote control system 10 and vehicle security and/or location system 20 may be held, such as the so-called Fiat-Shamir authentication methods taught in US Patent 4,748,668 to Shamir and Fiat, the disclosure of which is incorporated herein by reference. Such an embodiment provides a high level of communication security wherein security cannot be breached by listening to the communication between remote control system 10 and vehicle security and/or location system 20.

Additionally or alternatively, the valid operating signal may be generated as a function of the valid personal access code. The valid operating signal may comprise a randomly generated code.

Alternatively, processor 16 may be housed separately from transmitter 12 and input device 14 in a portion of vehicle security and/or location system 20. In the latter case, transmitter 12 transmits a signal comprising the personal access code. Certainly this is less preferable for security reasons.

Input device 14 may include a keyboard or touch pad for entering alphanumeric data. Alternatively, input device 14 may include a telegraphic code entry device, i.e., a device for entering a series of signals, sounds or "clicks", such as the familiar Morse code, which signals are recognized by processor 16. Additionally or alternatively, an optical signal device 22, such as a LED or LCD, may be used in conjunction with input device 14. For example, the optical signal device 22 may flash in a predetermined manner in accordance with the input of the personal access code to provide a use with a visual verification or aid that the personal access code is being entered properly. Alternatively, if the personal access code is, for example, 435, the optical signal device 22 may flash, and at the fourth flash, the user must press a button to transmit "4", then after the subsequent third flash, press the button to transmit "3", and so forth. Optical signal device 22 may be mounted either on remote control system 10 or any part of a vehicle.

Still alternatively, input device 14 may include a fingerprint reader or a voice recognition device.

Reference is now made to Fig. 2 which is a flow chart illustration of a method for remote control operation of a system, in accordance with a preferred embodiment of the present invention.

The remote control system 10 is first turned on by pressing a start button. A personal access code is entered in input device 14. Processor 16 compares the entered personal access code with a valid code, preferably stored in a memory, such as a PROM. If access code is found to be valid, then transmitter 12 is commanded to transmit a valid operating signal.

If the entered code is not valid, then, in accordance with a preferred embodiment of the present invention, processor 16 instructs transmitter 12 to transmit a decoy operating signal. If transmitter 12 were to transmit an operating signal *only* upon entering the valid personal code, hackers could possibly scan through a range of access codes and wait until a signal is transmitted, whereupon they would know that they have found the valid personal access code. By emitting a decoy signal, the hackers have no way of knowing which is the valid personal access code.

The number of false attempts may be counted, and upon passing a predetermined amount, transmitter 12 may be instructed to transmit a warning signal of an unauthorized access attempt, thereby providing an additional security feature.

It will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described hereinabove. Rather the scope of the present invention includes both combinations and subcombinations of the features described hereinabove as well as modifications and variations thereof which would occur to a person of skill in the art upon reading the foregoing description and which are not in the prior art.



## C L A I M S

What is claimed is:

1. A remote control system (10) comprising:  
a remote control transmitter (12);  
5 an input device (14); and  
a processor (16) in communication with said transmitter (12) and said input device (14), characterized by said processor (16) being operative to process an access code entered into said input device (14), to compare the entered code with a valid access code and to command said transmitter (12) to transmit a valid operating signal only upon entry of a valid personal access code  
10 into said input device (14).
2. The system (10) according to claim 1 and wherein said transmitter (12) and said input device (14) are housed together with said processor (16).
3. The system (10) according to claim 1 and wherein said transmitter (12) and said input device (14) are housed separately from said processor (16).
- 15 4. The system (10) according to claim 1 and wherein said transmitter (12) controls operation of at least one of a vehicle security system and a vehicle location system (20).
5. The system (10) according to claim 4 and wherein said processor (16) is housed together with at least one of said vehicle security system and said vehicle location system (20).
6. The system (10) according to claim 1 and wherein said input device (14) comprises  
20 a keyboard.
7. The system (10) according to claim 1 and wherein said input device (14) comprises a touch pad.
8. The system (10) according to claim 1 and wherein said input device (14) comprises a telegraphic code entry device.
- 25 9. The system (10) according to claim 1 and wherein said input device (14) comprises an optical signal device.
10. The system (10) according to claim 1 and wherein said input device (14) comprises a fingerprint reader.
11. The system (10) according to claim 1 and wherein said input device (14) comprises  
30 a voice recognition device.
12. A method for remote control operation, comprising:

entering a personal access code into a remote control system (10);  
processing the entered access code and comparing the entered code with a valid  
access code; and

transmitting a valid operating signal only upon entry of a valid personal access  
5 code.

13. The method according to claim 12 and comprising transmitting a decoy operating  
signal upon entry of a non-valid personal access code.

14. The method according to claim 12 or claim 13 and comprising transmitting a  
warning signal of an unauthorized access attempt if a number of entries of non-valid personal  
10 access codes is greater than a predetermined amount.

15. The method according to any of claims 12-14 and comprising encrypting the  
transmitted signal.

16. The method according to claim 12 and wherein said valid operating signal is  
generated as a function of said valid personal access code.

15 17. The method according to claim 12 and wherein said valid operating signal  
comprises a randomly generated code.

18. The method according to claim 12 and wherein said step of entering said personal  
access code comprises entering alphanumeric data.

19. The method according to claim 12 and wherein said step of entering said personal  
20 access code comprises entering data in accordance with a telegraphic code.

20. The method according to claim 12 and wherein said step of entering said personal  
access code comprises a combination of keyed-in signals and optical signals.

21. The method according to claim 12 and wherein said step of entering said personal  
access code comprises entering fingerprint identification information.

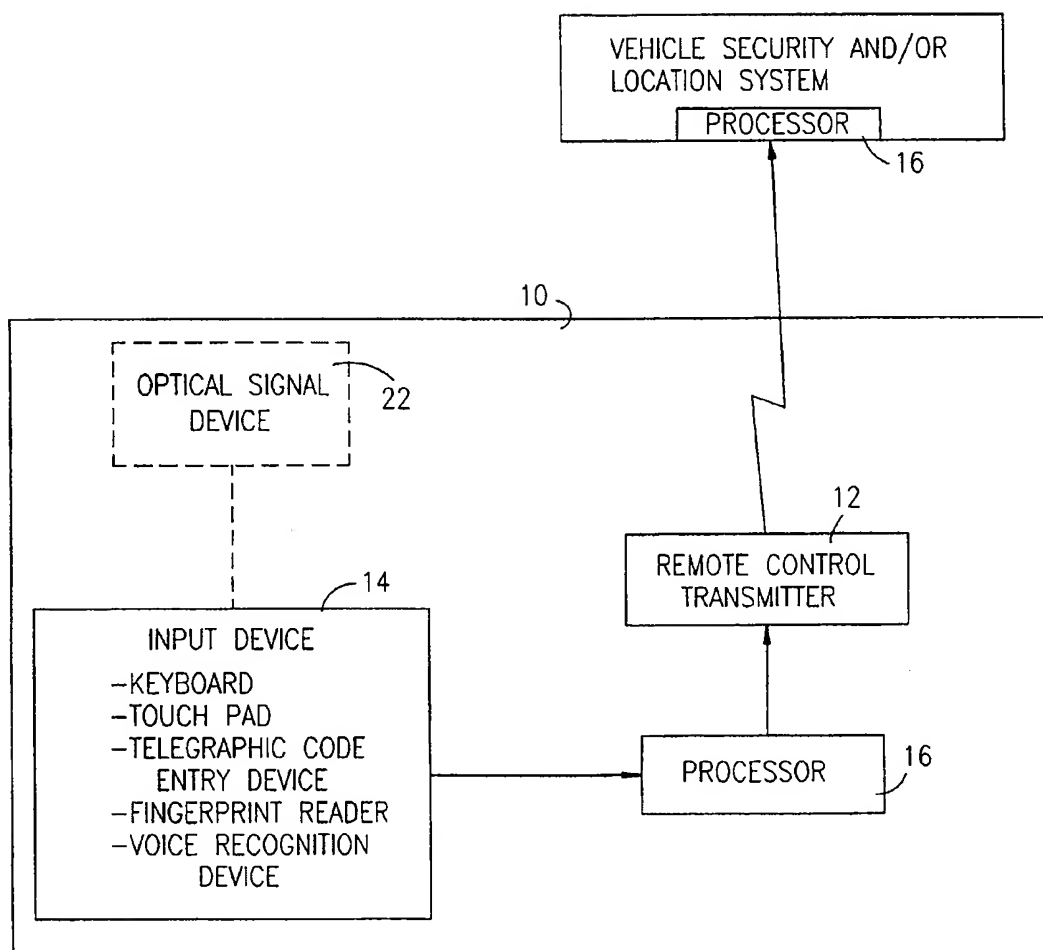
25 22. The method according to claim 12 and wherein said step of entering said personal  
access code comprises entering voice recognition information.

23. The method according to claim 12 and wherein said step of transmitting a valid  
operating signal disarms operation of at least one of a vehicle security system and a vehicle  
location system.

24. The method according to claim 12 and wherein said step of transmitting a valid operating signal initiates operation of at least one of a vehicle security system and a vehicle location system.

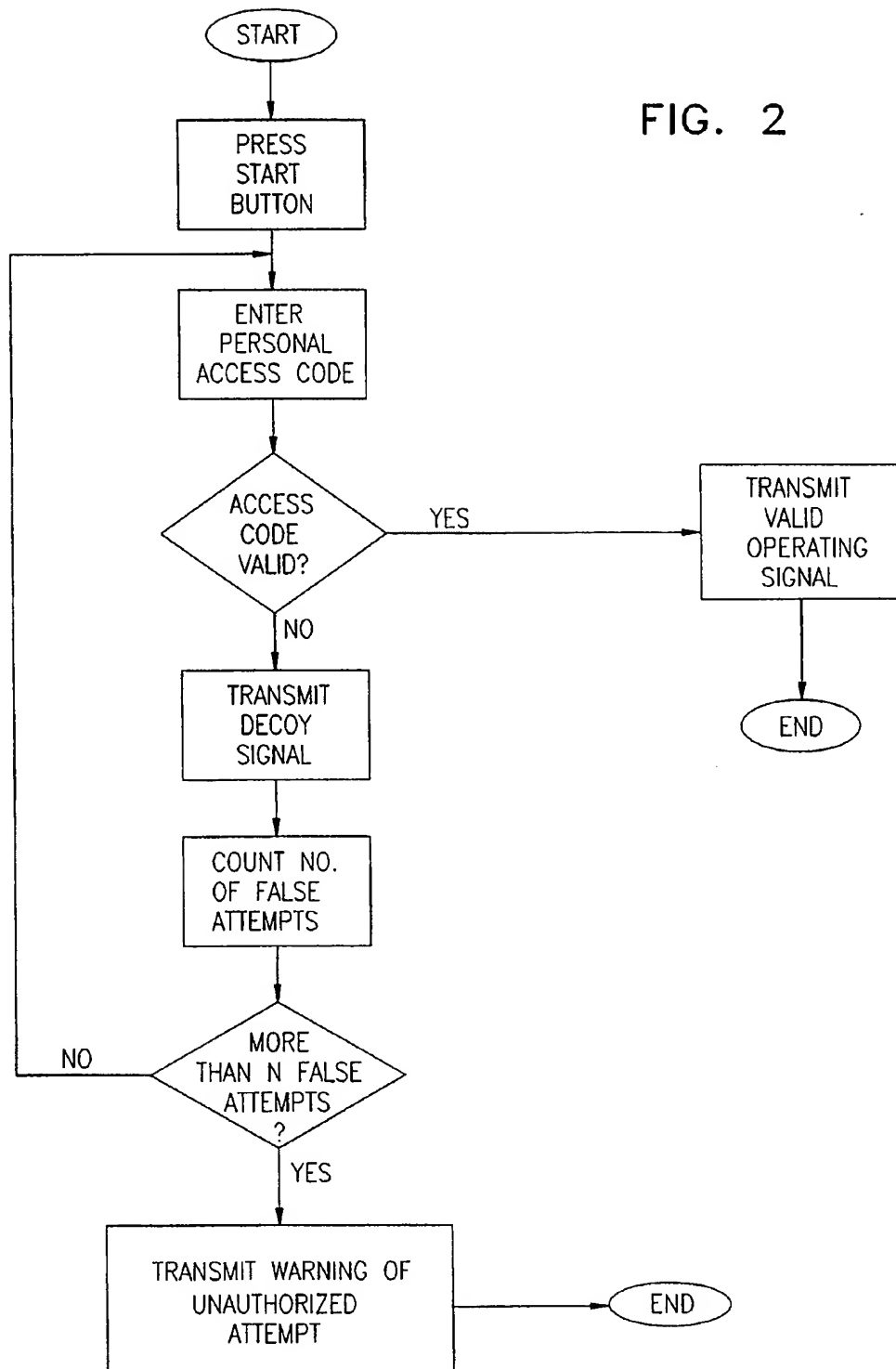
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FIG. 1



2/2

FIG. 2



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IL99/00125

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC(6) :H04Q 1/00 US CL :Please See Extra Sheet. According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) U.S. : Please See Extra Sheet.		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 4,786,900 A (KARASAWA et al.) 22 November 1988, col. 3 line 52 - col. 5 line 51, col. 7 line 47 - col. 10 line 15, col. 13 line 33 - col. 14 line 15 and col. 17 line 55 - col. 19 line 68.	1-2, 4, 6, 8-9, 11-12, 16-20, 22-24 ----- 3, 5, 7, 10, 13-14, 21
X --- Y	US 4,754,255 A (SANDERS et al.) 28 June 1988, Col. 2 line 9 - col. 3 line 24, col. 5 line 49 - col. 6 line 45 and col. 9 line 65 - col. 11 line 2.	1-6, 9, 12-14, 16, 18, 20, 23-24 ----- 7-8, 10-11, 17, 19, 21-22
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* "A" "B" "L" "O" "P"	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance earlier document published on or after the international filing date document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art *&* document member of the same patent family
Date of the actual completion of the international search 28 MAY 1999		Date of mailing of the international search report 16 JUN 1999
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230		Authorized officer EDWIN C. HOLLOWAY III Telephone No. (703) 305-4818 <i>Jon Hill</i>

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IL99/00125

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,800,590 A (VAUGHAN) 24 January 1989, col. 4 line 65 - col. 7 line 5 and col. 8 lines 1-66.	2-3, 5, 13-14, 16-17
Y	US 4,993,068 A (PIOSENKA et al.) 12 February 1991, Fig. 2, col. 1 lines 39-58, col. 5 lines 20-27 and col. 7 line 51 - col. 9 line 31.	7, 10-11, 21-22
Y	US 5,055,658 A (COCKBURN) 08 October 1991, col. 1 line 10 - col. 2 line 48.	7, 10-11, 21-22

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IL99/00125

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 15  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.



**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/IL99/00125

**A. CLASSIFICATION OF SUBJECT MATTER:**  
US CL :

340/825.31

**B. FIELDS SEARCHED**

Minimum documentation searched

Classification System: U.S.

340/825.31, 825.32, 825.49, 825.69, 825.72, 426; 380/23, 25; 235/382